(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 422 773 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90309754.1**

(22) Date of filing: **06.09.90**

(51) Int. Cl.5: **A01G 3/04**, B23D 49/16, B27G 19/00

(30) Priority: **12.09.89 GB 8920620**

(43) Date of publication of application: **17.04.91 Bulletin 91/16**

(84) Designated Contracting States: **AT BE DE DK ES FR GB IT NL SE**

(71) Applicant: **ELECTROLUX NORTHERN LIMITED**
Preston Road Aycliffe Industrial Estate
Newton Aycliffe Co. Durham, DL5 6UP(GB)

(72) Inventor: **Holmes, Alan Herbert**
48 Sturmer Crescent
Darlinton, Co, Durham DL1 4DQ(GB)

(74) Representative: **Arthur, Bryan Edward**
Withers & Rogers 4 Dyer's Buildings Holborn
London EC1N 2JT(GB)

(54) Improvements in and relating to power-driven cutting tools.

(57) This invention relates to power-driven cutting tools for use as a hedge timmer or a combined hedge trimmer and saw. In particular, the tool comprises a power source (M), a support means (S) for supporting a cutting member (C), means for placing the cutting member in at least two operating positions, relative to the support means and drive means (G1, G2) for drivingly connecting the power source and the cutting member when the cutting member is disposed in a selected operating position whereby cutting can be performed with the cutting member disposed in anyone of the said operating positions. The power source may be an electric motor or an internal combustion engine.

EP 0 422 773 A2

IMPROVEMENTS IN AND RELATING TO POWER-DRIVEN CUTTING TOOLS

This invention relates to power-driven cutting tools. In particular the invention relates to a power-driven cutting tool capable of use as a hedge trimmer or a saw or a combination of a hedge trimmer and a saw. Hedge trimmers and saws are known having two relatively reciprocatable blades. Power-driven saws, for example, tree felling and logging saws are also known including one or more endless chains supporting saw teeth or endless chains in which individual links constitute saw teeth. Throughout this specification and claims a toothed blade or supported saw teeth will be referred to as a "cutting member".

It is an object of the present invention to produce a power-driven cutting tool such as a hedge trimmer and/or a saw in which the cutting member can be driven when placed in two or more operating positions relative to a handle for the tool.

According to the present invention, a power driven cutting tool comprises a power source, a support means for supporting a cutting member (as herein before defined), means for placing the cutting member in at least two operating positions, relative to the support means and drive means for drivingly connecting the power source and the cutting member when the cutting member is disposed in a selected operating position whereby cutting can be performed with the cutting member disposed in anyone of the said operating positions. The power source may be an electric motor or an internal combustion engine.

Preferably, the cutting member comprises two blades each having cutting teeth and mounted for relative reciprocating movement to produce a cutting action resulting from the interaction of the teeth of each blade. EAch blade may be mounted for driving movement relative to the other. Alternatively, one blade may be fixed in which case the other blade is mounted for driving movement relative to the fixed blade. The blades may elongate with teeth disposed along each longitudinal edge. Alternatively, the blades may be formed as sectors of a circle.

Various embodiments of a power-driven cutting tool in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 is a perspective of a hedge trimmer/saw combination tool including two elongate and relatively reciprocatable toothed hedge trimming blades and with one of the two blades including a portion having saw teeth for cutting branches when a shield is displaced to permit sawing;

Figure 1A is a similar view to Figure 1 in which the saw-toothed portion of the blade is shielded and in a non-use position;

Figure 2 is a perspective of a tool similar to that shown in Figure 1; and taken from the opposite view point;

Figure 2A is an enlarged perspective of a cutting member carrier bar assembly for the tool of Figure 2;

Figure 2B is a perspective showing essential elements of a handle and electric control switch arrangement for the tool of Figure 2;

Figure 3 is a perspective of the tool of Figure 1 taken from the opposite direction;

Figures 4A to 4C show, in perspective details of further handle control switch arrangement.

Figures 5 and 5A show in sectional side elevation and perspective respectively a further form of tool according to the invention;

Figure 6 is a part sectional side elevation of yet a further embodiment according to the invention;

Figure 7 shows of a tool in perspective with in set details of safety edge blades (Figure 7A) and a pneumatically operated control switch;

Figure 8 shows, in perspective modified cutting teeth including a toothed skeleton inlaid to a plastic support;

Figure 9 and 9A show in perspective a further cutting blade assembly and cutting bar respectively, and

Figure 10 shows, an alternative eccentric device for driving the cutting blades.

Referring to Figures 1 and 1A and 3 the hedge trimmer/saw combination shwon has a support means S which supports a cutting member C . A power source, not shown, in the form of an electric motor or internal combustion engine is mounted within the support means S . The cutting member C is mounted in a carrier bar B (see Figure 2A) consisting of a upper member B1 and a lower member B2 between which two elongate toothed blades C1 and C2 are supported for relative longitudinal and reciprocal movement. A safe;ty end-stop C3 of generally semi-circular shape constitutes a safety device to prevent those extreme teeth remote from the support means of the toothed blades C1, C2 from becoming entangled with an operators clothing or a portion of a hedge which is not to be trimmed or injuring a person.

As shown in Figure 1 a portion C3 of the toothed blade C1 is formed with saw teeth C4. Further, teeth from blade C2 have been removed in the region the saw teeth C4 so that sawing of e.g. branches is effected simply by reciprocal movement of portion C3 and without cooperation of teeth on blade C2. If desired, however, teeth similar to

C4 may be formed on a corresponding portion of the blade C2 but, is such a case the teeth on the respective blades C1 and C2 should be formed with an opposite "set" so as to clear saw dust from a saw kerf produced during sawing. When an operator does not wish to use the saw C3, a cover C5, which is suitably carried on the carrier bar B, is slid into the position shown in Figure 1A shielding the teeth C4.

The support means S has two handles S1 and S2 and a hand shield S3. A main control switch S4 for controlling electric power supplied to the electric motor housed within the support means is mounted in the handle S1. Moreover, as shown in Figure 2B, four over-riding pressure pad switches S5 are positioned as indicated or the handle S2 so that an operator may, in the case of an emergency, readily cut-out supply of power to the electric motor. The spring biased linkage system L serves to connect each of the four pressure switches S5 and the switch S4.

The handle S2 may be angularly displaceable fore-and aft- about axis A-A (Figure 2B) via a restraining arrangement, not shown, so that in the event that an operator lunges or falls during operation of the cutting tool, the act of lunging or falling displaces the handle about the axis A-A to displace the linkage L and, thereby, cut-out power supply to the electric motor.

Drive from the electric motor to the blades of the cutting member C may take the form of any conventional driving linkage to produce reciprocal movement of the cutting blades C1 and C2 such as an eccentric or cam drive. Drive to the eccentric or cam drive may be via a system of bevel or spur gears G1/G2 as illustrated in Figure S1. Where drive is accomplished using a bevel gear drive as shown in Figure 5, the handle and support means 5 in which electric motor M is housed may be angularly displaced around axis Z-Z at a parting plane P-P in one or more indexed steps so as to change the angle of the plane containing the blades C1/C2 relative to the handle S1.

A safety cut-out switch (not shown) is mounted in handle S2 so that, in the event of an emergency, an operator can activate either of the switches S2 or S4 to cut-out power supplied to the electric motor.

Referring to Figure 5, alternatively, or in addition to displacing the support means S housing motor M about axis Z-Z of bevel gear G1 the cutting member and associated eccentric drive may be mounted for displacement about axis Y-Y of bevel gear G2. In this way, whilst the plane of reciprocal operation of the cutting blades C1/C2 relative to the support means S remains the same, nevertheless, the handle S1 and the blades C1/C2 will not be in alignment when viewed in the direction of arrow Q in Figure 5. The degree of angular displacement may be indexed in equal or unequal angular steps.

Figures 4A, 4B and 4C show in exploded detail, handle control switch arrangement for the handle S2. In Figure 4A a non-cohesive, uncoated fibre optic F is used in conjunction with an LED transmitter-receiver combination. Ends F1 and F2 of the fibre optic F are optically connected to receivers R1 and R2 which, in turn, are mounted in optical alignment with LED transmitters T1 and T2. Resiliently mounted handle grips H1, H2 and H3 each include an arcuate extension H1A, H2A and H3A which bear against the optical fibre F when the optical fibre is in an "un-bent" or"non-distorted" attitude, that is when the cutting tool is operating normally under control of the main control switch S4 (see Figure 1). When, however, an operator wishes to cut-off power to the power source housed within the support means, he may do so promptly by either using the main control switch S4 or any one of the interlocked switches H1, H2 or H3 which upon depression cause the appropriate arcuate extension H1A, H2A or H3A to bend the fibre optic F and, thereby reduce the amount of light transmitted to either receiver R1 or R2 so as to trip a control switch and cut-out power to the motor M.

Figure 4B shows a handle S2 of similar shape to that shown on Figure 4A but, in this case power to the motor M is cut-out by a resistance controlled switch arrangement. The handle S2 is contructed from two interconnected components S2A and S2B and each component carries an associated conductive plastic plate S2A1 and S2B1 respectively. Gripping and squeezing together the two handle components S2A and S2B alters the resistance between the plates S2A1 and S2B1 which triggers the control switch. If desired, the two conductive plates S2A1 and S2B1 may be mounted in a mini computer which is operable according to a change in status of an electrical parameter (e.g. capacitive resistive, voltage or current) to thereby cut-out power to the motor M.

In contrast to the electrical control switch arrangements of Figures 4A and 4B, Figure 4C shows a mechanical interlock system. As shown in Figure 4C, the handle S2 houses three handle grips H10, H20 and H30. Handle grips H10 and H30 are angularly displaceable in the direction of arrows H40 and H50 about pivot points H60 and H70 respectively. Such angular displacement causes ends H80 and H90 of bell cranks H82 and H92 to be moved inwardly in the direction of arrows H81 and H91 to trip the control switch and cut-out power to the motor M. The handle grip H20 is mounted for sliding movement against a biasing force in the direction of arrow H22. The handle

grips H20 has two arms H24 and H26 each carrying a respective pin H24A and H26A located, as shown in a triangular apertured member H24B and H26B. Displacement of the handle grip H20 in the direction the arrow H22 causes, the pins H24A and H26A to cooperate with surfaces H24C and H26C thereby causing the handle grips H10 and H30 to be angularly displaced in the direction of the arrows H40 and H50 to trip the control switch as previously described.

Referring to Figure 6 handle S2, motor M and the cutting member C are mounted for pivotal movement about axis R and means (not shown) are provided for locking the pivotally movable parts in any desired angular position.

Figures 7, 7A and B show another embodiment of the cutting tool in which a safety switch S9 supported in handle S2 is operated against an air sack S10 as shown in Figure 7B. Compression of the air pack S10 in the direction of arrow A7 causes expansion of the sack against a spring biassed switch plunger SP to break an electrical connection between a switch not shown. Further, asshown in Figure 7A the teeth of the supper blade C1 are of narrower width then the teeth of blade C2. A similar toothed formation is shown in Figure 8 modified with individual steel teeth C8 in laid in the upper toother bar C1 which is made from a plastic material.

Figure 8 shows a modification of the cutting member C in which the blade C1 is made from a plastics material having a skeleton of metal teeth C8 inlaid therein.

Figures 9 and 9A show a fixed cutting blade C1 and a toothed cutting member C2 in the form of an endless chain which is supported on a carrier bar B and a multi faced idler pulley M disposed remotely from the handle S2 and support means S not shown. A modified, elliptically sectioned carrier bar B made in two parts B1 and B2 is shown in Figure 9B. In Figure 9B, the upper carrier bar B1 is formed with fixed teeth faced with steel insuits 55 whereas teeth equivalent to those on the cutting member C2 are mounted for reciprocating movement within the carrier bar B as previously described.

Figure 10 shows an alternative eccentric device for the cutting teeth in which toothed elements T are carried on a toothed wheel W driven by a rack R which may be in the form of an endless chain or a reciprocatable toothed bar.

Reference has been made above in connection with Figure 5 regarding different ways for angularly adjusting the position of the cutting blades C1/C2 relative to the support means S. Alternatively, the handle S1 may, of itself, be mounted for pivotal movement relative to the support means S and cutting blades considered together as a unitary structure. The handle S1 may be pivoted about an axis disposed in the line of arrow headed lines AA-AA or BB-BB in Figure 1.

Claims

1. A power driven cutting tool comprising a power source, a support means for supporting a cutting member, means for placing the cutting member in at least two operating positions, relative to the support means and drive means for drivingly connecting the power source and the cutting member when the cutting member is disposed in a selected operating position whereby cutting can be performed wih the cutting member disposed in anyone of the said operating positions. The power source may be an electric motor or an internal combustion engine.

2. A tool according to Claim 1 wherein the cutting member comprises two blades each having cutting teeth and means for creating relative reciprocating movement of the blades to produce a cutting action resulting from the intervention of the teeth of each blade.

3. A tool according to claim 2 including means for independently driving each blade.

4. A tool according to claim 2 wherein one blade is fixed and the other blade is mounted for reciprocating movement relative thereto.

5. A tool according to claim 2 wherein one toothed blade is fixed and the other blade comprises a plurality of teeth mounted on an endless carrier forming a loop, and means for driving the said other blade around a closed path to produce a cutting action from interaction of the teeth of each blade.

6. A tool according to claim 2 wherein each blade is in the forming of a sector of a circle and a plurality of teeth disposed on the arcuate boundaries of the respective blades.

7. A tool according to any preceding claim wherein one blade includes a portion disposed adjacent the support means having saw teeth shaped for cutting solid wood- like material, and a cover slidably mounted on at least the said one blade for shielding the saw teeth when not in use.

8. A tool according to claim 1 including a safety stop disposed at that end of the cutting member remote from the support means.

9. A tool according to any preceding claim wherein the blades are driven by an electric motor or an internal combustion engine.

10. A tool according to claim 9 incldiuing a handle carried by the support means a main switch for controlling electric power to the electric motor and at least one emergency safety switch mounted on the handle for actuation by an operator.

11. A tool according to claim 1 including a hinge connection disposed between the support means and the cutting member, the hinge connection having a huge pin disposed in the plane of the cutting member and transversely thereto whereby the cutting member can be disposed in anyone of a plurality of different operating positions our means for securing the cutting member in any selected operating position.

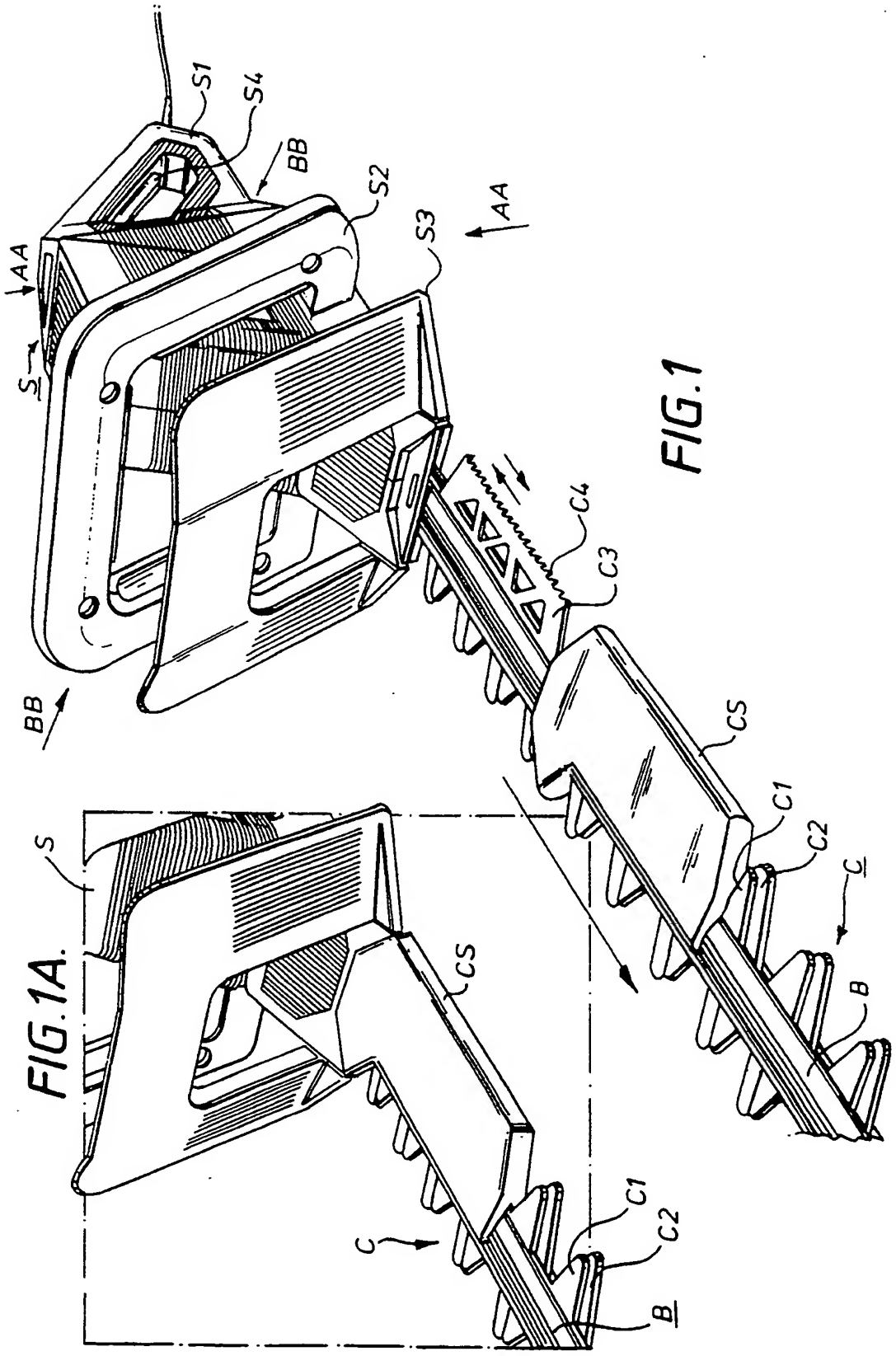


FIG.1

FIG.1A.

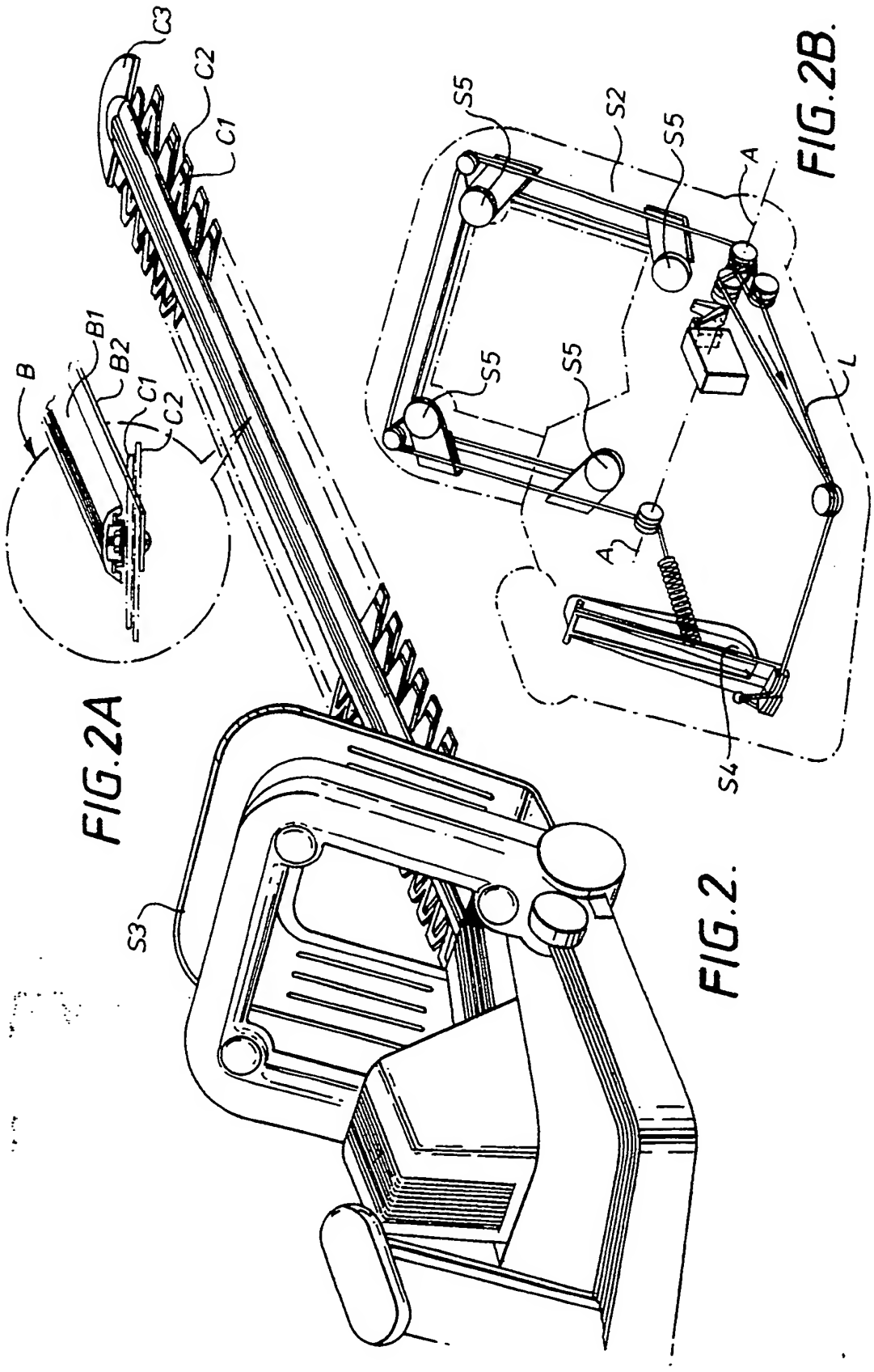


FIG.2A

FIG.2B.

FIG.2.

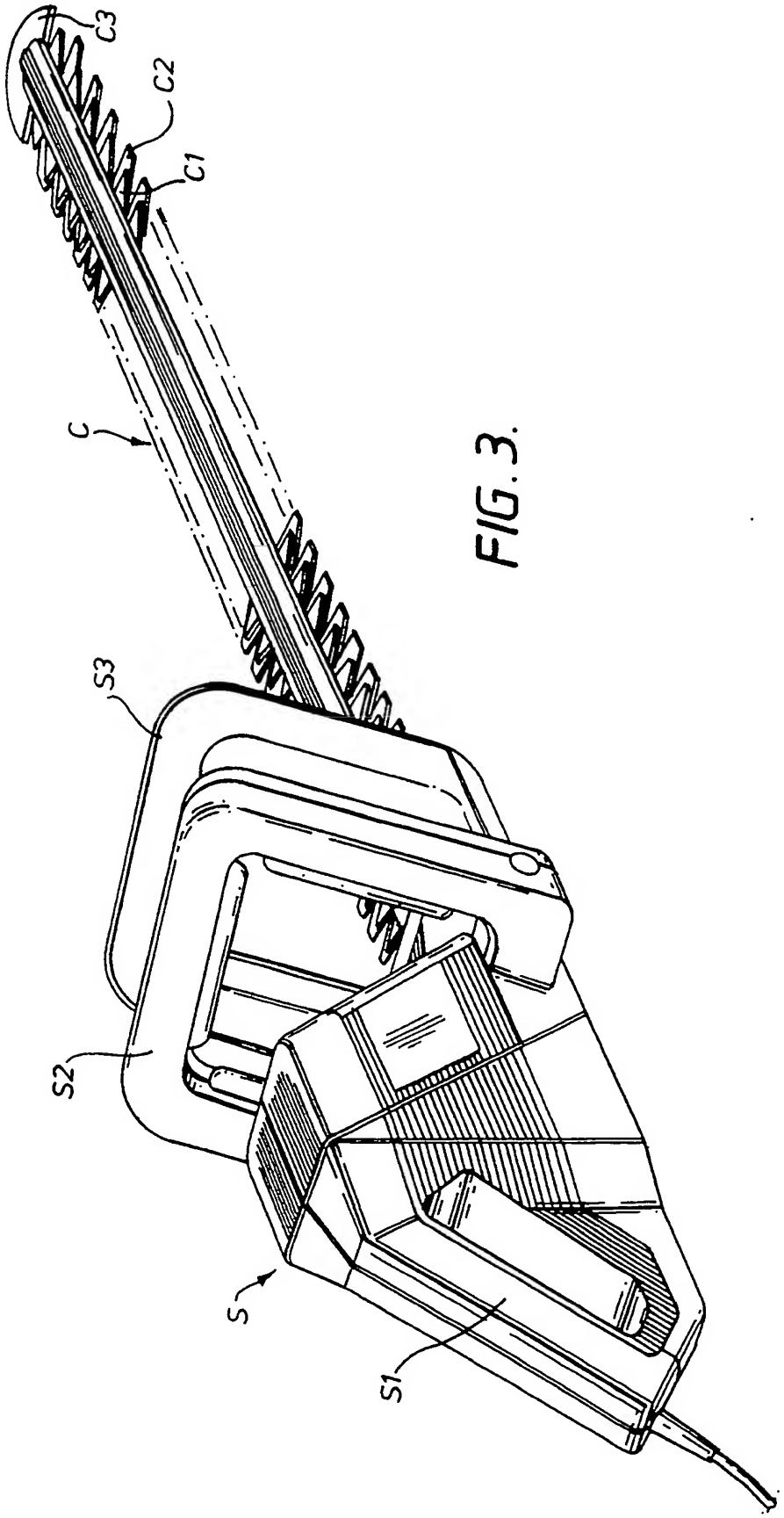


FIG. 3.

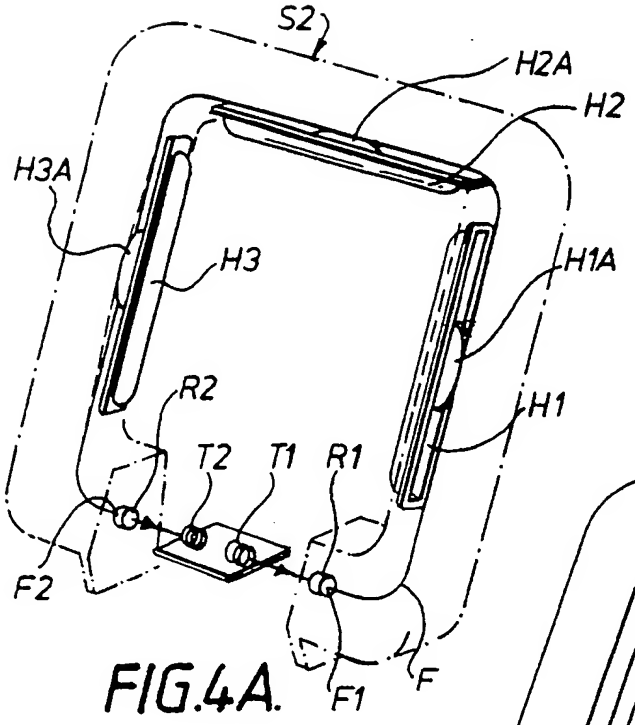
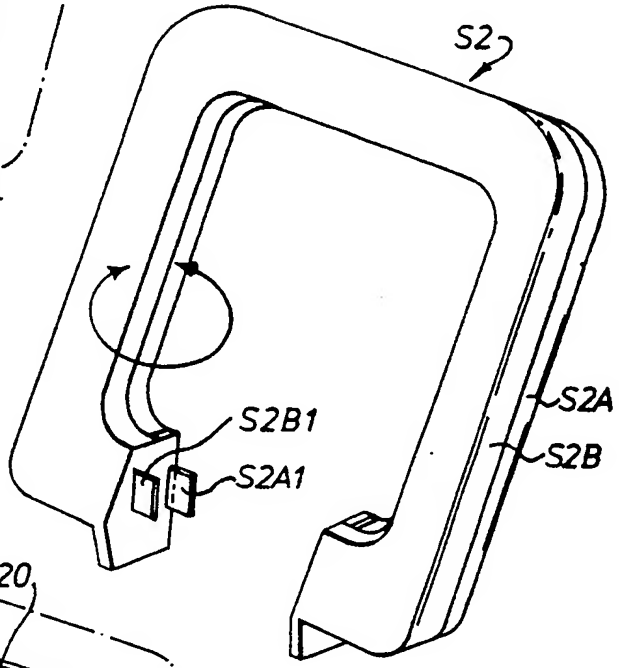


FIG.4A.

FIG.4B.



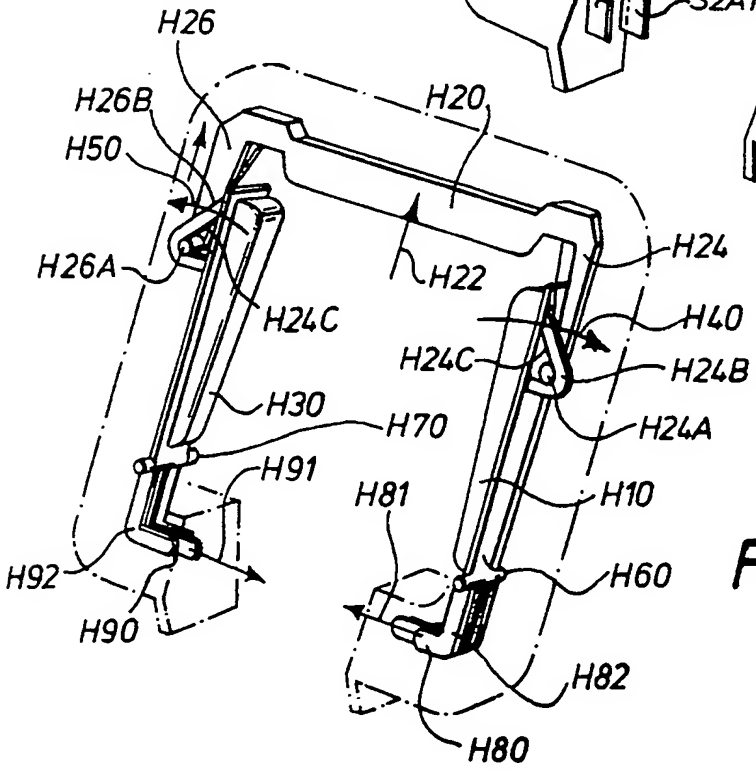


FIG.4C.

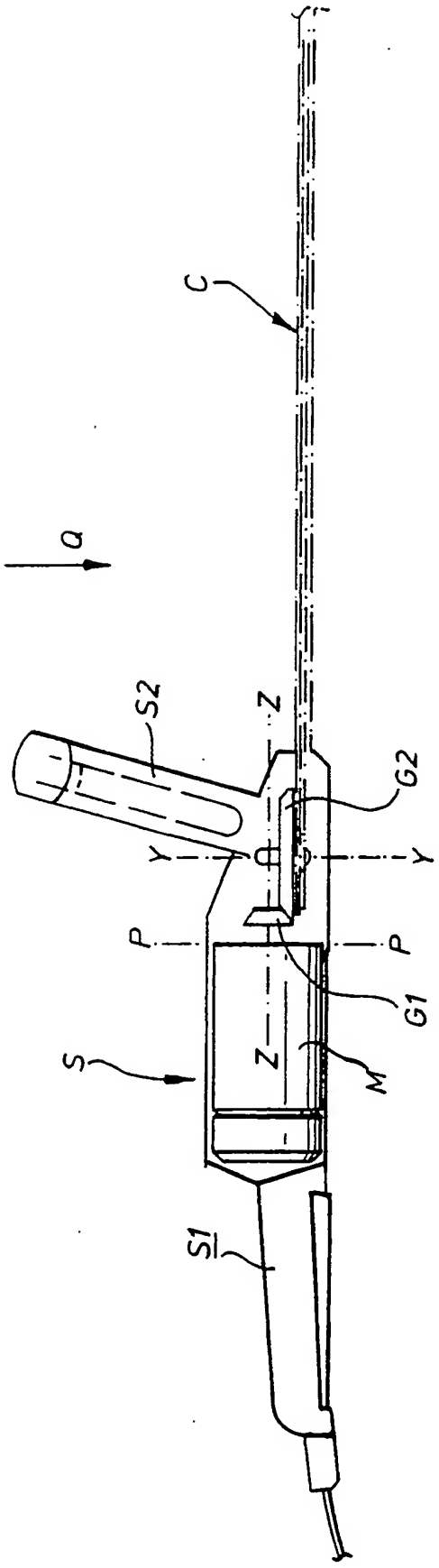


FIG.5.

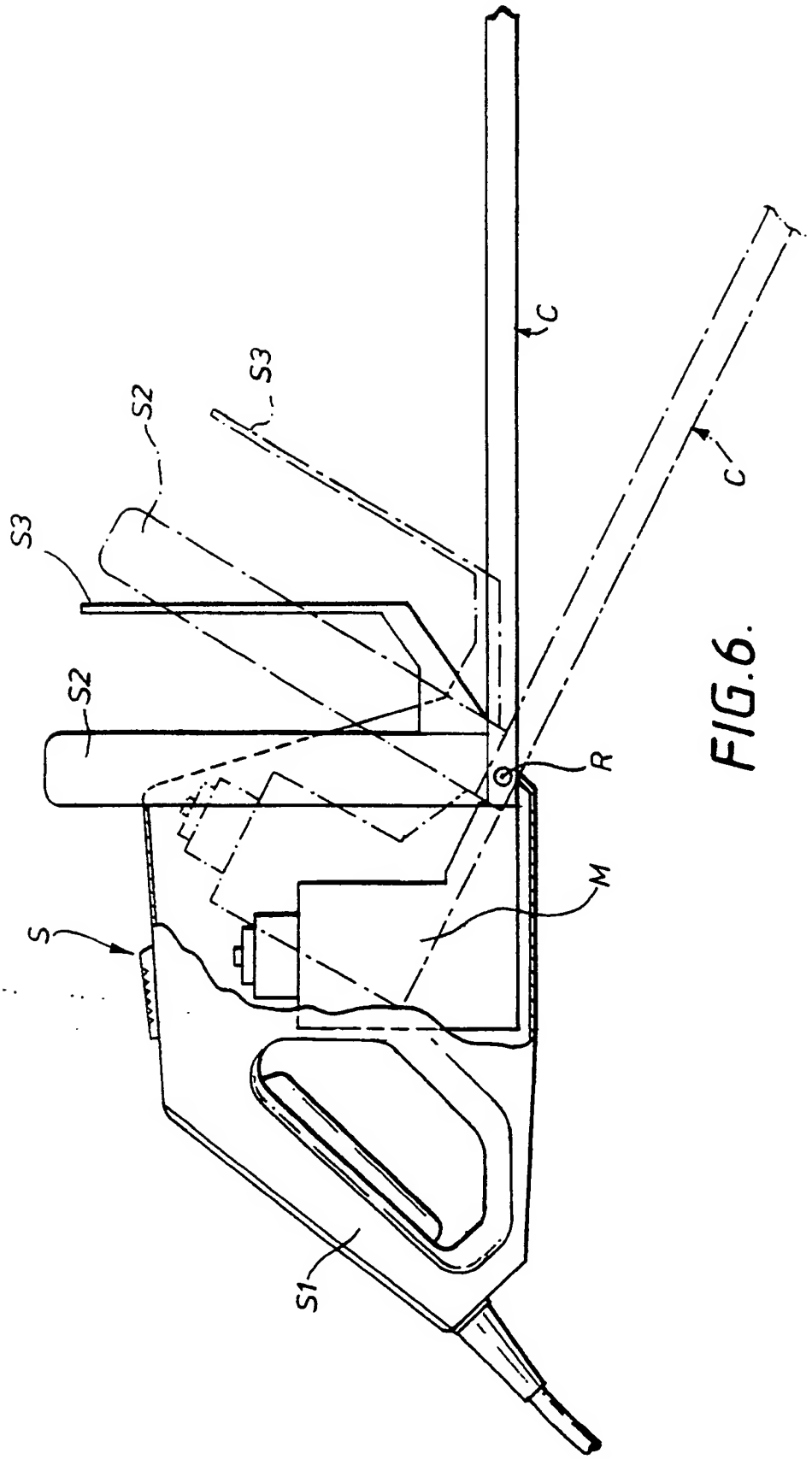


FIG.6.

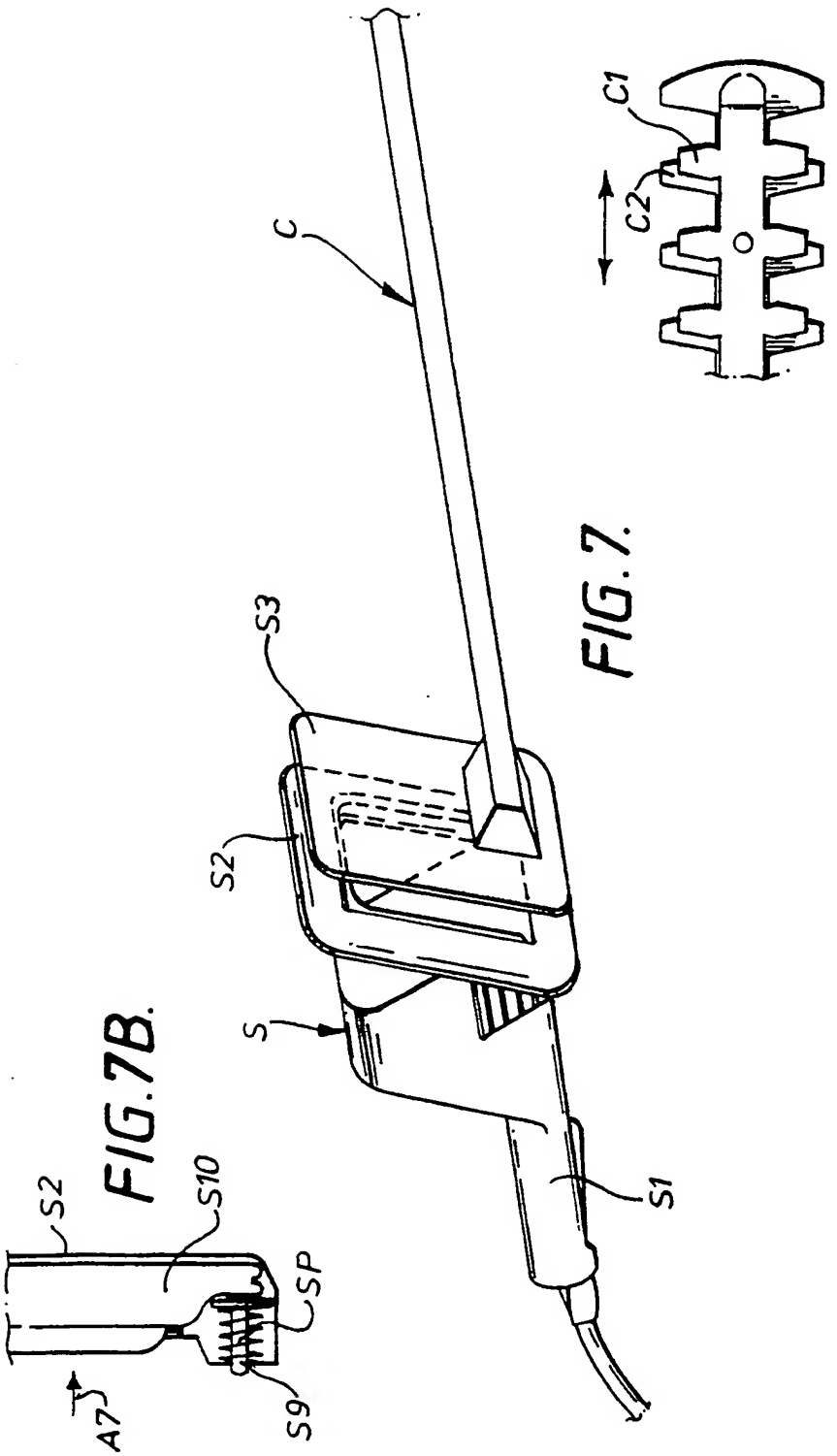


FIG.7.

FIG.7A.

FIG.7B.

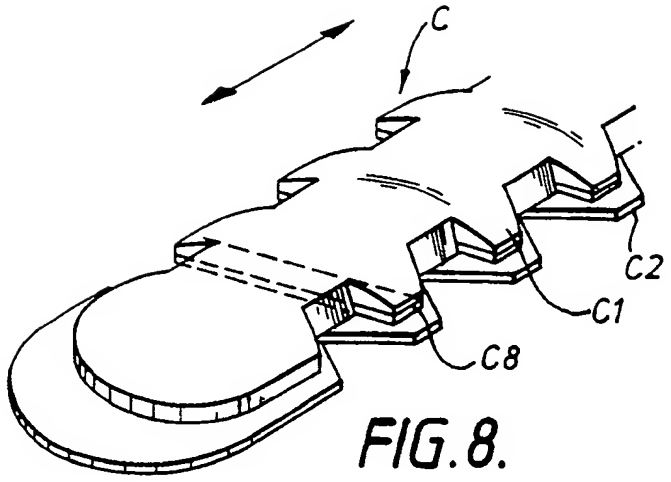


FIG.8.

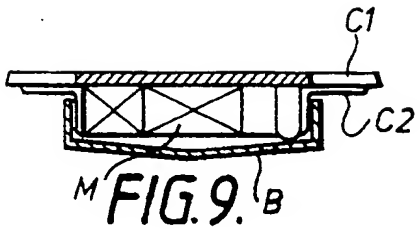


FIG.9.

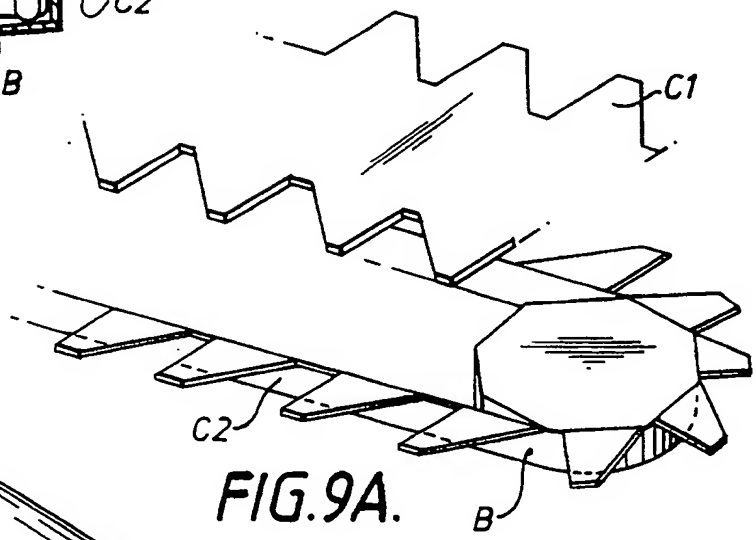


FIG.9A.

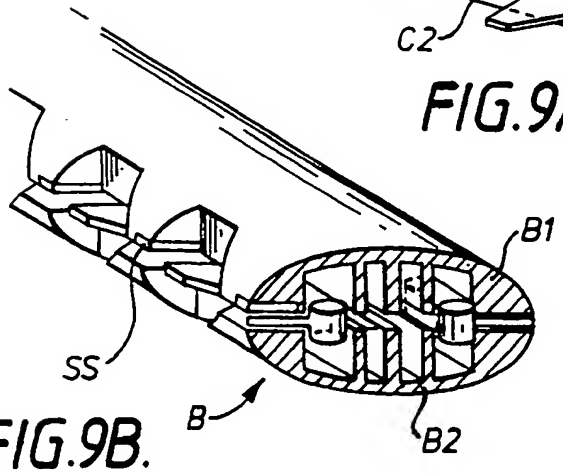


FIG.9B.

FIG. 10.